SYSTEM AND METHOD FOR BOOKMARKING A ROUTE

FIELD OF THE INVENTION

The present invention relates generally to communication systems. In particular, the present invention provides a method and system for storing a relationship between two or more points (such as a route between the two points) and obtaining information about that relationship.

BACKGROUND OF THE INVENTION

In a typical communication system, such as the Internet, it is possible to visit a location within the system, store the location (e.g. "bookmark" the location) and then return to that location at a later time. For example, Microsoft™ Internet Explorer allows a user to access a given web site, bookmark the site and then return to the same site at a later time. Once bookmarked, the user may easily access the site, usually by selecting the bookmark from a stored list of bookmarks (in Internet Explorer this list is typically called "Favorites".)

In a typical communication system, it is also possible to enter location data for more than one location, store the data and then access the data at a later time. For example, Yahoo™ allows a user to enter one or more street addresses (such as a pair of cross-streets) on a web page, store the entered data (e.g. "bookmark" the data) and then access the data at a later time. Once bookmarked, the user may easily access the data, usually by selecting the bookmark from a stored list of bookmarks (in Yahoo™, this list is typically called "My Locations").

In a wireless communication system, it may also be possible to obtain immediately pertinent information in relation to bookmarked data. For example, a user may obtain information about a stored street address such as directions from the address or current weather conditions at the address.

However, typical communication systems have limited capabilities. It would be desirable therefore to provide a method additional capabilities for a communications system.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating a communication system in which the invention can be implemented;

FIG. 2 is a flow chart illustrating a routine for storing a relationship between two points;

FIG. 3 is a flow chart illustrating a routine for accessing a relationship stored using the embodiment of **FIG. 2**;

FIG. 4 is a flow chart illustrating another routine for accessing a relationship stored using the embodiment of **FIG. 2**;

FIG. 4 is a flow chart illustrating another routine for accessing a relationship stored using the embodiment of **FIG. 2**;

FIG. 5 is a flow chart illustrating another routine for accessing a relationship stored using the embodiment of **FIG. 2**; and

FIG. 6 is an exemplary block diagram illustrating another embodiment of a communication system.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

A system and method permit saving of a route between an originating location and a destination. The route may be identified by a first location and a second location. A route-identifier is used to identify a route between the first location and the second location, and route identifier is stored. The route identifier is used to retrieve the route. Typical communications systems do not allow the ability to select more than one location, save the relationship between the selected locations and then return to the relationship at a later time. Typical communications systems also do not allow the ability to obtain pertinent information about the relationship at a later time. In particular, a typical communication system does not allow selection of a first location and one or more additional location to create a route that may then be bookmarked.

FIG. 1 is a block diagram illustrating one embodiment of a communication system **10**. The communication system **10** generally includes

one or more network access devices or communication devices **12**, **32**, communication networks **14**, **18** and a communication node **16**. The communication system **10** may also include one or more of each of the following: route application **64**, route database **62**, geographic source **60** and information source **58**.

As further described below, the communication system **10** may provide various services and capabilities to cellular users, wire-line telephone users, paging users, satellite users, mobile or portable telephone users, trunked users, computer network users (e.g., Internet or Intranet users), wireless data users, branch office users, cable users and the like. Communication system **10** may also accurately locate communication device **12, 32** and/or its associated user **20**, **30** in order to provide location-relevant services to the user **20**, **30** via device **12, 32**. Communication system **10** may also accurately locate any relevant location in order to provide services to the user **20, 30** via device **12, 32.** Communication system **10** or any of its components may be operated by any entity, including, without limitation, a government agency, a commercial entity, or any other appropriate entity.

In one embodiment of the invention, communication system **10** also includes a route application **64**. Route application **64** may include one or more programs or other applications for creating and otherwise processing information about two or more points, such as geographic points, or information about routes between two or more points. Route application **64** may comprise computer readable/processable program code. Such route information may be information input by user **20**, **30** via device **12**, **32**. Route application **64** may also process information to be sent to or stored in route database **62**. Alternatively, route information processed by route application **64** may be information provided by communication node **16** or forwarded by communication node **16** from communication networks **14**, **18**. Route information processed by route application **64** may also be provided by information sources such as route database **62** or geographic source **60**. Route application **64** may interact with user **20**, **30** via device **12**, **32**. Route application **64** may reside on or be in communication with communication node **16** or communication device **12**, **32**.

Route application **64** may process information from one or more information sources. One such information source is route database **62**. In one embodiment of the present invention, route database **62** stores geographic locations in the form of routes between two or more geographic locations. For example, a user may send a geographic location such as the route between two or more street addresses (e.g. "Route from Home to Work") to be stored in route database **62**. The user may input the location to be stored from a communication device **12**, **32** via communication node **16**.

Route database **62** may contain an identifier and associated route information. For example, route database **62** may contain the identifier "HOME/WORK" and the route information "starting point: 3200 N. Clark Street, Chicago, Illinois 60657 and endpoint point: 1603 Orrington Avenue, Evanston, Illinois 60201" as one entry. The data stored in route database **62** may also take other forms including, but not limited to, latitude/longitude, points of interest or intersections. For example, the route and identifier above may also take the format "HOME/WORK" and associated route information "first endpoint: Belmont and Clark, Chicago and second endpoint: Orrington and Davis, Evanston, Illinois". The data stored in route database **62** may also store information in a combination of forms. For example, the route and identifier above may also take the form "HOME/WORK" and associated route information "endpoint 1: Belmont and Clark, Chicago and endpoint 2: Bank One Building, Evanston, Illinois."

Route application **64** may also process information from one or more information sources such as geographic source **60**. In one embodiment of the present invention, geographic source **60** stores authentic ("real") geographic locations. Alternatively, this geographic source **60** authenticates, verifies or otherwise processes information about to be stored or already stored in route database **62**. For example, a user may send a route such as those described above to be stored in route database **62**. Before the route is accepted to be stored, communication system **10** authenticates or otherwise processes the address using geographic source **60**. For example, geographic source **60** may be a GIS engine that authenticates each of the addresses in a given route as existing addresses. In one embodiment of the invention, geographic source **60** may authenticate that the route is accurate, e.g. the user desires to

store the route between his home and a hotel in Seattle but the geographic source **60** indicates the hotel is no longer at the location entered by the user. In another embodiment, geographic source **60** may complete or correct the location input by the user, verifying that the address is authentic and unambiguous and completing the address with the zip code or zip + 4. For example, the user says "endpoint 1 is Belmont and Clarke, spelled C-L-A-R-K-E, Chicago, Illinois and endpoint 2 is the Bank One Building, Evanston, Illinois" and the geographic source provides the corrected information that the first endpoint is "Belmont and Clark, spelled C-L-A-R-K Chicago, Illinois 60657" and the completed information that the second endpoint is "Bank One Building, Evanston, IL 60201." The user may input the route to be stored from a communication device **12, 32** via communication node **16**.

In one embodiment, geographic source **60** may comprise authentic ("real") cellular and sector identification information. Geographic source **60** may also include maps relating to such cellular and sector identification information. Geographic source **60** may also include geographical and non-geographical information about countries, states/provinces, counties/parishes, metropolitan areas, cities, ZIP codes, area codes, landmarks, points of interest, subway and train stations, airports, streets, gas stations, Automated Teller Machines (ATMs), hospitals, police stations, restaurants, etc. In one embodiment, geographic source **60** may comprise a virtual map of a given area, complete with a listing of all geographical entities on the map, such as a listing of all streets within Chicago, Illinois, for example. Geographic source **60** may also include such information as specific names and addresses (e.g. a list of hospital names and their addresses) or a more general address listing (e.g. an electronic "yellow pages").

Location parameters that may be corrected, completed or otherwise processed using information from geographic source **60** include, but are not limited to: lists of streets within a city; lists of streets within a cell or sector; lists of streets within a state; lists of street names and numbers; zip code lists; lists of street intersections; lists of landmarks in a given city, state, cell or sector; lists of places of interests in a given city, state, cell or sector; lists of banks in a given city, state, cell or sector; lists of restaurants in a given city, state, cell or sector; lists of hotels in a given city, state, cell or sector; lists of

post offices in a given city, state, cell or sector; lists of businesses of a given type in a given city, state, cell or sector, etc.

Route application **64** may also process information from one or more other information sources **58**. In one embodiment of the present invention, information source **58** stores information that may be relevant to a given route. Such information includes, but is not limited to, traffic conditions, weather conditions, upcoming conditions along the way (e.g., toll booths coming up on the route), relevant locations on the route (e.g., restaurants along the route, banks along the route.) For example, a user may send a route such as those described above to be stored in route database **62**. Before the route is accepted to be stored or after the route has been stored, communication system **10** may provide information about the route using information source **58**. For example, information source **58** may provide up-to-date weather conditions for the area encompassing user's "HOME/WORK" route or, if the route covers a large area, weather conditions for portions of the route. Alternatively, information source **58** may provide traffic conditions at points along the route. Alternatively, information source **58** may provide information about a third point on the route, e.g., the location of a toll booth on the route, the McDonalds™ nearest to the first endpoint of the route, or the name of the bank closest to the second endpoint of the route. Alternatively, if the user is currently on the route, information source may provide information about the user's location on the route, e.g. weather conditions for the user's current location on the route.

Information source **58** may be, for example, a web site on the Internet in communication with or accessed by communication system **10** or a component of system **10**. Information source **58** may also be a service, such as a weather service in communication with or accessed by communication system **10** or a component of system **10**, e.g. the National Weather Service.

The communication device **12, 32** of the communication system **10** may be utilized by end user **20**, **30** to access and/or connect with the communication node **16**. Communication device **12, 32** may also be used by end user **20**, **30** to access and/or connect with route application **64**. The communication device **12, 32** can include, but is not limited to, wireline telephones, mobile telephones, paging units, radio units, wireless data

devices, Web telephones, portable or wireless telephones, personal information managers (PIMs), personal digital assistants (PDAs), personal computers (PCs), network televisions (TVs), Internet TVs, Internet telephones, portable wireless devices (i.e., two-way pagers), security systems (both mobile and premises-based), workstations or any other suitable communication devices.

Regardless of its specific form, the communication devices **12, 32** have user-input interfaces **24**, **28** and/or user-output interfaces **34**, **38**. Alternatively, the user-input interfaces **24**, **28** and/or user-output interfaces **34**, **38** may work in conjunction with the communication device **12, 32** without actually residing on the device **12, 32**.

The user-input interfaces **24**, **28** may receive input from the users **20, 30** and the user-output interfaces **34**, **38** may provide output to the users **20, 30**. The user-input interfaces **24**, **28** can include, but are not limited to, an electroacoustic transducer, such as, for example, a microphone to receive voice and other audible input from the users **20**, **30** a keypad or a keyboard to receive key strokes from the users **20**, **30** a touchpad or touchscreen to receive touch input from the users **20**, **30** a handwriting recognition interface to receive handwritten input from users **20**, **30** and a pointing device such as a mouse or a trackball to receive point and click inputs from the users **20**, **30**. In one embodiment of the present invention, user-input interface **24**, **28** may be a modified car dashboard allowing input from users **20**, **30**.

The user-output interfaces **34**, **38** of the communication devices **12, 32** can include, but are not limited to, an electroacoustic transducer such as, for example, a speaker to provide voice and other audible output to the users **20**, **30**, and a visual display device such as a liquid crystal display or a cathode ray tube to provide graphical and/or textual information to the users **20**, **30**. In one embodiment of the present invention, user-output interface **34**, **38** may be a modified car dashboard providing output to users **20**, **30**.

Each of the communication devices **12, 32** may include more than one user-input interface **24**, **28** or more than one user-output interface **34**, **38**. Moreover, the user may use one or more user-input interfaces **24**, **28** or user-output interfaces **34**, **38** simultaneously. For example, a wireless

telephone may have a microphone, a telephone keypad, a speaker, and a visual display device.

In one embodiment of the invention, an input interface **24**, **28** may also reside on the communication node **16**. Output interface **34**, **38** may also reside on the communication node **16**. Alternatively, input interface **24**, **28** may reside on the communication node **16** while output interface **34**, **38** resides on the device **12, 32**. Alternatively, input interface **24**, **28** may reside on the device **12, 32** while output interface **34**, **38** resides on communication node **16**.

The communication device **12, 32** may also communicate with communication networks **14, 18** via the communication node **16**. The communication network **14** can interface with the communication device **12, 32** through wireline or wireless networks or systems (i.e., telephone or televisions systems, Integrated Services Digital Network (ISDN) systems, coaxial lines, computer networks, digital end user lines, private networks, wireless local loop systems, etc.). Information sources **58** may be accessible to, available on or in communication with communication networks **14, 18.**

The communication networks **14**, **18** of the communication system **10** can include, but are not limited to, intranets, extranets, the Internet, a Local Area Network (LAN), a telephone network, (e.g., a Public Switched Telephone Network (PSTN), private telephone networks, etc.), a cellular network, satellite networks, a personal communication system, a TV network (e.g., a cable TV system), local, regional, national or global paging networks, an email system, a wireless data network (e.g., satellite data or local wireless data networks), a wireless LAN, a wireless local loop/distribution system (e.g., LMDS, MMDS or Code Division Multiple Access (CDMA) based system), a Voice Over Internet Protocol (VOIP) network, or any other suitable network. The communication networks **14**, **18** can also include a wide area network (WAN), such as, for example, the Internet, the World Wide Web (WWW) or any other similar on-line service. It will be recognized that the communication networks **14**, **18** may have portions in common, may comprise two separate networks, or may be the same network.

The communication node **16** of the communication system **10** can include, but is not limited to, an interactive voice response node, a server

computer, the MIX™ platform and the Myosphere™ Service provided by Motorola, Inc. of Schaumburg, IL (as further described with reference to **FIG. 6**), or other suitable system. It will be recognized that the communication node **16** may be integrated within or may be remote from the communication networks **14**, **18**.

FIG. 2 illustrates one embodiment of a routine for storing a relationship between two points in accordance with the present invention at **2000.** The routine of **FIG. 2** may be used, for example, when a user **20, 30** first attempts to store a relationship between two or more points, such as a travel route between two locations.

At block **2010** an input signal is received describing the route. This input signal may take the form of data describing a starting point and an endpoint. For example, the user may say "Identify 'Belmont and Clark, Chicago, Illinois' as the start point and 'Davis and Orrington, Evanston, Illinois' as the endpoint of a route called "HOME/WORK". The input signal may also take the form of data describing versions of the route (e.g. fastest version, scenic version, version of route using the shortest distance, version without any highways, version of route with no tolls). For example, the user may say "Identify the route between 3200 North Clark in Chicago, Illinois and 1600 Orrington Avenue in Evanston, Illinois which uses Lake Shore Drive as 'HOME/WORK-FASTEST".

At Block **2020**, the action to be taken determines which routine may be used in accordance with the present invention. For example, **FIG. 2** shows three possible actions: GET INFORMATION, ADD and MODIFY. These three actions serve as examples and do not limit the actions that may be taken in accordance with the present invention.

In the case of adding a route to be stored, at block **2030** a route identifier may be received. This identifier may be included in the initial input signal transmitted at Blocks **2010**. Alternatively, the route identifier may be sent separately.

At Block **2035** the uniqueness of the route identifier is evaluated. In one embodiment, this evaluation is performed by route application **64**. Alternatively, this evaluation is performed by node **16** or by route application

64 on node **16**. In one embodiment this evaluation includes a determination by route application **64** of whether or not the route identifier is already in use. If the route identifier is already in use (as seen at **2037**) another route identifier may be received as illustrated at **2030**. If the route identifier is already in use, the communication node **16** may indicate to user **20, 30** that a new route identifier should be chosen.

In one embodiment, the user is prompted to confirm the route identifier received at Block **2030**. In another embodiment the identifier may be provided to the user and then confirmed. Alternatively, the route identifier may be generated by route application **64**, by communication node **16** or another party, such as a system administrator.

If the route identifier received at Block **2030** is not currently in use or is otherwise determined to be unique, the route associated with the route identifier may be processed (Block **2050)**. For example, the points of the route may be processed (e.g., converted to an appropriate format such as a latitude and longitude). Such processing may also include encrypting the route identifier and associated route or any other suitable processing. Such processing may also include adding further information to the route identifier and its associated route. For example, processing may include completing geographic information related to the points of the route, e.g. adding a zip code or a zip+4 to the addresses associated with one or more points of the route. As another example, processing may include adding a route type describing the associated route (e.g. fastest route, shortest route, scenic route).

Then at block **2060,** the route identifier and its associated route may be stored in any suitable manner, such as, for example, in a database in communication with communication node **16** or device **12**, **32**.

During the time the route and route identifier are being processed, a signal may be sent to the user, for example via the browser of device **12**, **32**. This signal may contain one or more commands to the browser of device **12**, **32**. In one embodiment of the invention, the signal may be sent via node **16**. Alternatively, the signal may be sent directly from route application **64**. In one embodiment of the invention, device **12**, **32** may tell the user "Route 'HOME/WORK' being stored" during this time period.

Once the route identifier and associated route have been stored, the route application **64** may send a response to the user **20, 30**. This response may contain one or more commands. For example, device **12, 32** may say "Route 'HOME/WORK' has been stored". Device **12, 32** may also prompt "Store route 'HOME/WORK' now?" or may ask additional information from the user, such as "Is this the fastest route between Home and Work?"

FIG. 3 illustrates one embodiment of a routine for retrieving information relevant to a route in accordance with the present invention at **3000**. The routine of **FIG. 3** may begin with the input signal being received as illustrated at Block **2010** of **FIG. 2.** Alternatively, the routine of **FIG. 3** may begin after a route identifier has already been stored as illustrated at block **2060**.

At Block **3030** of **FIG. 3**, the route identifier may be received. The identifier may be, for example, a suitable route identifier as described above. At block **3035**, a request for information about the route identified by the route identifier may also be received. For example, the user may request "Tell me current traffic conditions on route "HOME/WORK". The request may also further describe the version of the route identified by the route identifier. For example, the user may say "Access fastest route for "HOME/WORK". In **FIG. 3**, the steps shown at **3030** and **3035** may occur in any suitable order.

Then, at Block **3040,** it may be determined if the route identifier has been stored within system **100**. For example, it may be determined if the route identifier has been stored in route database **62**. Such a route identifier may have been stored, for example, as indicated at Block **2060** of **FIG. 2**. If the route identifier has been stored, the information associated with the route identifier may then be retrieved at block **3050**. Alternatively, if the route identifier has not previously been stored, the routine may return to **3030** as shown in **FIG. 3**. Another identifier may then be received.

Once the route information has been retrieved at block **3050**, as seen at block **3060**, information relevant to the route may be retrieved. This route-relevant information may be stored in any suitable location and may be accessed by any suitable component of system **100**. For example, the route-relevant information may be stored in information source **58** or geographic source **60**. In one example, information about the current traffic conditions may be retrieved from a traffic database or a news service. The

route-relevant information may also be dynamically created information rather than accessed information. For example, the route-relevant information may be a calculation of the shortest version of the route identified by the route identifier. Alternatively, the information relevant to the route may be a combination of accessed and dynamically created information. For example, the information provided may be traffic conditions for various roads that can be used to complete the route identified by the route identifier.

At block **3070**, the retrieved information may be presented. For example, the user may hear "There is an accident at 5600 North Clark on route 'HOME/WORK'." The user may also hear "There is an accident on the shortest distance route of 'HOME/WORK'. Would you like to determine an alternative 'HOME/WORK' route?"

FIG. 4 illustrates another embodiment of a routine for retrieving information relevant to a route in accordance with the present invention at **4000**. The routine of **FIG. 4** may begin with the input signal being received as illustrated at Block **2010** of **FIG. 2.** Alternatively, the routine of **FIG. 4** may begin after a route identifier has already been stored as illustrated at block **2060**.

At Block **4030** of **FIG. 4**, the route identifier may be received. The identifier may be, for example, a suitable route identifier as described above. At block **4035**, a location identifier may also be received. This location identifier may be any suitable identifier that describes a location along the route identifier by the route identifier. In one embodiment of the invention, the location identifier describes a third point between the starting point and ending point of the route identified by the route identifier. For example, the location identifier may identify where a mobile user is currently located on the route "HOME/WORK", e.g. "My location is about 3 miles from the starting point of route "HOME/WORK". This location identifier may be input by the user **20, 30.** The location identifier may also be input by another entity, such as, for example, a global positioning device on the user's car. In **FIG. 4**, the steps shown at **4030** and **4035** may occur in any suitable order.

Then, at Block **4040,** it may be determined if the route identifier has been stored within system **100**. For example, it may be determined if the route identifier has been stored in route database **62**. Such a route identifier

may have been stored, for example, as indicated at Block **2060** of **FIG. 2**. If the route identifier has been stored, the information associated with the route identifier may then be retrieved at block **4050**. Alternatively, if the route identifier has not previously been stored, the routine may return to **4030** as shown in **FIG. 4**. Another identifier may then be received.

Once the route information has been retrieved at block **4050**, as seen at block **4060**, information relevant to the location identified by the location identifier may be retrieved. This location-relevant information may be stored in any suitable location and may be accessed by any suitable component of system **100**. For example, the location-relevant information may be stored in information source **58** or geographic source **60**. In one embodiment, information about the current traffic conditions may be retrieved from a traffic database or a news service. For example, the traffic conditions for a point five miles from the ending point of route "HOME/WORK" may be provided to the user. In another embodiment, the location of other objects in relation to the location identified by the location identifier may be provided in the context of the route identified by the route identifier. For example, the location of the toll booth nearest to the mobile user's current location may be provided in the context of the route the user is on.

At block **4070**, the retrieved information may be presented. For example, the user may hear "Traffic is clear from your current location all the way to the HOME point of route 'HOME/WORK'." The user may also hear "The nearest toll booth to your current location is another two blocks along the route 'HOME/WORK'."

FIG. 5 illustrates one embodiment of a routine for modifying the stored route information in accordance with the present invention at **4000**. The routine of **FIG.** 5 may begin with the input signal being received as illustrated at Block **2010** of **FIG. 2.** Alternatively, the routine of **FIG. 5** may begin after a route identifier has already been stored as illustrated at block **2060**.

At Block **5030** of **FIG. 5**, the route identifier may be received. The identifier may be, for example, a suitable route identifier as described above.

Then, at Block **5040,** it may be determined if the route identifier has been stored within system **100**. For example, it may be determined if the route identifier has been stored in route database **62**. Such a route identifier

may have been stored, for example, as indicated at Block **2060** of **FIG. 2**. If the route identifier has not previously been stored, the routine may return to block **5030** as shown in **FIG. 5.** Another identifier may then be received.

If the route identifier has been stored, a decision may be made to modify the route identifier at block **5050.** If the route identifier will not be modified, the routine may return to block **5030** as shown in **FIG. 5.** Another identifier may then be received. If the route identifier will be modified, a modified route identifier is received at **5060.**

At Block **5070** the uniqueness of the modified route identifier is evaluated. In one embodiment, this evaluation is performed by route application **64**. Alternatively, this evaluation is performed by node **16** or by route application **64** on node **16**.

If the route identifier received at Block **5070** is not currently in use or is otherwise determined to be unique, the route associated with the modified route identifier may be processed (Block **5090)**. For example, the points of the route may be processed (e.g., converted to an appropriate format such as a latitude and longitude). Such processing may also include encrypting the modified route identifier and associated route or any other suitable processing. Such processing may also include adding further information to the modified route identifier and its associated route. For example, processing may include completing geographic information related to the points of the route, e.g. adding a zip code or a zip+4 to the addresses associated with one or more points of the route.

Then at block **2095,** the modified route identifier and its associated route may be stored in any suitable manner, such as, for example, in a database in communication with communication node **16** or device **12**, **32**.

Referring now to **FIG. 5**, an exemplary block diagram of another embodiment of a communication system **200** having the capability to bookmark a route between two or more locations is illustrated.

The communication system **200** generally includes one or more communication devices **201**, **202**, **203**, **204**, **205** (five being shown), an electronic network **206**, and one or more information sources (e.g., content providers **208**, **221** (two being shown) and data and voice markup language servers **209**, **251**, **253**, **257**).

The user can access the electronic network **206** by dialing a single direct access telephone number (e.g., a foreign telephone number, a local telephone number, or a toll-free telephone number or PBX) from the communication device **201**. The user can also access the electronic network **206** from the communication device **202** via the Internet **220** or WWW, from the communication device **203** via a paging network **211**, or from the communication device **205** via a LAN, a WAN, an e-mail connection or in any other similar manner.

As shown in **FIG. 5**, the electronic network **206** includes a telecommunication network **210** and a communication node **212**. The telecommunication network **210** is preferably connected to the communication node **212** via a high-speed data link, such as, for example, a T1 telephone line, a LAN, a WAN or a VOIP network. The telecommunication network **210** preferably includes a PSTN **214** and a carrier network **216**. The telecommunication network **210** can also include, for example, international or local exchange networks, cable TV networks, inter-exchange carrier or long distance carrier networks, cellular networks (e.g., mobile switching centers), PBXs, satellite systems, wireless data networks and other switching centers such as conventional or trunked radio systems (not shown), etc. The electronic network **206** can also include additional telecommunication networks, such as, for example, a wireless data network **207**.

The PSTN **214** can include various types of communication equipment, such as, for example, ATM networks, Fiber Distributed Data networks (FDDI), T1 lines, cable TV networks, VOIP networks and the like. The carrier network **216** generally includes a telephone switching system or central office **218**.

It will be recognized that the carrier network **216** can be any suitable system that can route calls to the communication node **212**, and the central office **218** can be any suitable wire-line or wireless switching system.

The communication node **212** is preferably configured to receive and process incoming calls from the carrier network **216** and the Internet **220**. The communication node **212** can receive and process pages from the paging network **211** and can also receive and process messages (e.g., e-mails) from the LAN, WAN, wireless data or e-mail system **213**.

When a user dials into the electronic network **206** from the communication device **201**, the carrier network **216** routes the incoming call from the PSTN **214** to the communication node **212** over one or more telephone lines or trunks. The incoming calls preferably enter the carrier network **216** through one or more "**888**" or "**800**" Inward Wide Area Telecommunications Services trunk lines, local exchange or long distance trunk lines. It is also contemplated that the incoming calls can be received from a cable, cellular or VOIP network or any other suitable system.

The communication node **212** answers the incoming call from the carrier network **216** and retrieves an appropriate announcement (e.g., a welcome greeting) from a database, server or browser. The communication node **212** then plays the announcement to the caller. In response to audio inputs from the user, the communication node **212** retrieves information from a destination or database of one or more of the information sources, such as the content providers **208**, **221** or the markup language servers **209**, **251**, **253**, **257**. After the communication node **212** receives the information, it provides a response to the user based upon the retrieved information.

The communication node **212** can provide various dialog voice personalities (e.g., a female voice, a male voice, etc.), and can implement various grammars (e.g., vocabulary) to detect and respond to the audio inputs from the user. In addition, the communication node **212** can automatically select various speech recognition models (e.g., English, Spanish or English accent models) based upon a user's profile, communication device and/or speech patterns. The communication node **212** can also allow the user to select a particular speech recognition model.

When a user accesses the electronic network **206** from a communication device **201**, **202**, **203**, **204**, **205** registered with the system (e.g., home telephone, work telephone, cellular telephone, etc.), the communication node **212** can by-pass a user screening option and automatically identify the user (or the type of communication device) through the use of ANI or CLI. After the communication node **212** verifies the call, the communication node **212** provides a greeting (e.g., "Hi, this is your personal agent, Mya. Welcome Bob. How may I help you?"). The communication

node **212** then enters into a dialogue with the user, and the user can select a variety of services offered by the communication node **212**.

When the user accesses the electronic network **206** from a communication device not registered with the system (e.g., a payphone, a telephone of a non-user, etc.), the communication node **212** answers the call and prompts the user to enter his or her name and/or a personal identification number (PIN) using voice commands or DTMF signals. The communication node **212** can also utilize speaker verification to identify the particular speech pattern of the user. If the communication node **212** authorizes the user to access the system, the communication node **212** provides a personal greeting to the user (e.g., "Hi, this is your personal agent, Mya. Welcome Ann. How may I help you?"). The communication node **212** then enters into a dialogue with the user, and the user can select various services offered by the communication node **212**. If the name and/or PIN of the user cannot be recognized or verified by the communication node **212**, the user will be routed to a customer service representative.

Once the user has accessed the communication system **200**, the user may implement a wide variety of services and features by using voice commands, such as, for example, voice dialing, voice paging, facsimiles, caller announcements, voice mails, reminders, call forwarding, call recording, content information (e.g., newspapers, etc.), read e-mail, read calendars, read "to-do" lists, banking, e-commerce. The communication system **200** can place outbound calls and pages to business and personal parties or contacts (e.g., friends, clients, business associates, family members, etc.) in response to DTMF signals or voice commands. The calls can be routed through a telephone or electronic network to the selected party and the pagers can be sent to a selected party via a paging system. The communication system **200** can also receive calls routed through a telephone or electronic network.

As shown in **FIG. 5**, the communication node **212** preferably includes a telephone switch **230**, a voice or audio recognition (VRU) client **232**, a VRU server **234**, a controller or call control unit **236**, an Operation and Maintenance Office or a billing server unit **238**, a LAN **240**, an application server unit **242**, a database server unit **244**, a gateway server or router firewall server unit **246**, a VOIP unit **248**, a voice browser **250**, a voice markup language server **251**, a

messaging server **255** and a data markup language server **253**. Although the communication node **212** is shown as being constructed with various types of independent and separate units or devices, the communication node **212** can be implemented by one or more integrated circuits, microprocessors, microcontrollers or computers which may be programmed to execute the operations or functions equivalent to those performed by the devices or units shown. It will also be recognized that the communication node **212** can be carried out in the form of hardware components and circuit designs and/or software or computer programs.

The communication node **212** can be located in various geographic locations throughout the world or the United States (e.g., Chicago, IL). The communication node **212** can be operated by one or more carriers (e.g., Sprint, Qwest, MCI, etc.) or independent service providers (e.g., Motorola, Inc.).

The communication node **212** can be integrated with the carrier network **216** or can be located remote from the carrier network **216**. It is also contemplated that the communication node **212** may be integrated into a communication device, such as, for example, a wire-line or wireless telephone, a radio device, a PC, a PDA, a PIM, etc., and can be programmed to connect or link directly to an information source.

The communication node **212** can also be configured as a standalone system to allow users to dial directly into the communication node **212** via a direct access telephone number. In addition, the communication node **212** may comprise a telephony switch (e.g., a PBX or Centrix unit), an enterprise network or a LAN. In this configuration, the communication system **200** can be implemented to automatically connect a user to the communication node **212** when the user accesses a communication device.

When the telephone switch **230** receives an incoming call from the carrier network **216**, the call control unit **236** sets up a connection in the telephone switch **230** to the VRU client **232**. The communication node **212** then enters into a dialog with the user regarding various services and functions. The VRU client **232** preferably generates pre-recorded voice announcements and/or messages to prompt the user to provide inputs to the communication node **212** using voice commands or DTMF signals. In

response to the inputs from the user, the communication node **212** retrieves information from a destination of one of the information sources and provides outputs to the user.

The telephone switch **230** is preferably connected to the VRU client **232**, the VOIP unit **248** and the LAN **240**. The telephone switch **230** receives incoming calls from the carrier network **216**. The telephone switch **230** also receives incoming calls from the communication device **202** routed over the Internet **220** via the VOIP unit **248**. The telephone switch **230** also receives messages and pages from communication devices **203**, **205**, respectively. The telephone switch **230** is preferably a digital cross-connect switch, Model LNX, available from Excel Switching Corporation, Hyannis, MA. It will be recognized that the telephone switch **230** can be any suitable switch.

The VRU client **232** is preferably connected to the VRU server **234** and the LAN **240**. The VRU client **232** processes voice communications, DTMF signals, pages and messages (e.g., e-mails). Upon receiving voice communications, the VRU client **232** routes the speech communications to the VRU server **234**. When the VRU client **232** detects DTMF signals, it sends a command to the call control unit **236**. It will be recognized that the VRU client **232** can be integrated with the VRU server **234**.

The VRU client **232** preferably comprises a PC, such as, for example, a Windows NT compatible PC, with hardware capable of connecting individual telephone lines directly to the telephone switch **230** or carrier network **216**. The VRU client **232** preferably includes a microprocessor, random access memory, read-only memory, a T1 or ISDN interface board, and one or more voice communication processing boards (not shown). The voice communication processing boards are preferably Dialogic boards, Antares Model, available from Dialogic Corporation, Parsippany, NJ. The voice communication boards may include a voice recognition engine having a vocabulary for detecting a speech pattern. The voice recognition engine is preferably a RecServer software package, available from Nuance Communications, Menlo Park, CA.

The VRU client **232** can also include an echo canceller (not shown) to reduce or cancel TTS or playback echoes transmitted from the PSTN **214** due

to hybrid impedance mismatches. The echo canceller is preferably included in an Antares Board Support Package, also available from Dialogic.

The call control unit **236** is preferably connected to the LAN **240**, and sets up the telephone switch **230** to connect incoming calls to the VRU client **232**. The call control unit **236** also sets up incoming calls or pages to the communication node **212** over the Internet **220** and pages and messages sent from the communication devices **203**, **205** via the paging network **211** and e-mail system **213**, respectively. The control call unit **236** preferably comprises a PC, such as, for example, a Windows NT compatible PC.

The LAN **240** allows the various components and devices of the communication node **212** to communicate with each other via twisted pair, fiber optic, coaxial cables or the like. The LAN **240** may use Ethernet, Token Ring or other suitable types of protocols. The LAN **240** is preferably a **100** Megabit per second Ethernet switch, available from Cisco Systems, San Jose, CA, and can comprise any suitable network system. The communication node **212** may include a plurality of LANs.

The VRU server **234** is connected to the VRU client **232** and the LAN **240**. The VRU server **234** receives voice communications from the user via the VRU client **232**. The VRU server **234** processes the voice communications and compares the voice communications against a vocabulary or grammar stored in the database server unit **244** or a similar memory device. The VRU server **234** provides output signals, representing the result of the voice communications processing, to the LAN **240**. The LAN **240** routes the output signal to the call control unit **236**, the application server unit **242** and/or the voice browser **250**. The communication node **212** then performs a specific function associated with the output signals.

The VRU server **234** preferably includes a TTS unit **252**, an automatic speech recognition (ASR) unit **254**, and a STT unit **256**. The TTS unit **252** receives textual data or information (e.g., e-mail, web pages, documents, files, etc.) from the application server unit **242**, the database server unit **244**, the call control unit **236**, the gateway server unit **246**, the application server unit **242** and the voice browser **250**. The TTS unit **252** processes the textual data and converts the data to voice data or information.

The TTS unit **252** can provide data to the VRU client **232**, which reads or plays the data to the user. For example, when the user requests information (e.g., news updates, stock information, traffic conditions, etc.), the communication node **212** retrieves the desired data (e.g., textual information) from a destination of the one or more of the information sources and converts the data via the TTS unit **252** into a response.

The response is then sent to the VRU client **232**. The VRU client **232** processes the response and reads an audio message to the user based upon the response. It is contemplated that the VRU server **234** can read the audio message to the user using human recorded speech or synthesized speech. The TTS unit **252** is preferably a TTS **2000** software package, available from Lernout and Hauspie Speech Product NV, Burlington, MA.

The ASR unit **254** provides speaker dependent or independent automatic voice recognition of voice communications from the user. It is contemplated that the ASR unit **254** can include speaker dependent voice recognition. The ASR unit **254** processes the voice communications to determine whether a word or a speech pattern matches any of the grammars or vocabulary stored in the database server unit **244** or downloaded from the voice browser **250**. When the ASR unit **254** identifies a selected speech pattern of the voice communications, the ASR unit **254** sends an output signal to implement the specific function associated with the recognized speech pattern. The ASR unit **254** is preferably a speaker independent voice recognition software package, RecServer Model, also available from Nuance Communications. It is contemplated that the ASR unit **254** can be any suitable voice recognition unit to detect voice communications.

The STT unit **256** receives voice communications and converts the voice communications to textual information (e.g., a text message). The textual information can be sent or routed to the communication devices **201**, **202**, **203**, **204**, **205**, the content providers **208**, **221**, the markup language servers **209**, **251**, **253**, **257**, the voice browser **250** and the application server unit **242**. The STT unit **256** is preferably a Naturally Speaking software package, available from Dragon Systems, Newton, MA.

The VOIP unit **248** is preferably connected to the telephone switch **230** and the LAN **240**. The VOIP unit **248** allows a user to access the

communication node **212** via the Internet **220** or VOIP public network using voice commands. The VOIP unit **248** can receive VOIP protocols (e.g., H.**323** protocols) transmitted over the Internet **220** or Intranet, and can convert the VOIP protocols to voice information or data. The voice information can then be read to the user via the VRU client **232**. The VOIP unit **248** can also receive voice communications from the user and convert the voice communications to a VOIP protocol that can be transmitted over the Internet **220**. The VOIP unit **248** is preferably a Voice Net software package, also available from Dialogic Corporation. It will be recognized that the VOIP unit **248** can be incorporated into a communication device.

The communication node **212** also includes a detection unit **260**. The detection unit **260** is preferably a phrase or key word spotter unit, detecting incoming audio inputs or communications or DTMF signals from the user. The detection unit **260** is preferably incorporated into the telephone switch **230**, but can be incorporated into the VRU client **232**, the carrier network **216** or the VRU server **234**. The detection unit **260** is preferably included in a RecServer software package, also available from Nuance Communications.

The detection unit **260** records the audio inputs from the user and compares the audio inputs to the vocabulary or grammar stored in the database server unit **244**. The detection unit **260** continuously monitors the user's audio inputs for a key phase or word after the user is connected to the node **212**. When the detection unit **260** detects the key phrase or word, the VRU client **232** plays a pre-recorded message to the user. The VRU client **232** then responds to the audio inputs provided by the user.

The billing server unit **238** is preferably connected to the LAN **240**. The billing server unit **238** can record data about the use of the communication node **212** by a user (e.g., length of calls, features accessed by the user, etc.). Upon completion of a call by a user, the call control unit **236** sends data to the billing server unit **238**. The billing server unit **238** can subsequently process the data in order to prepare customer bills. The billing server unit **238** can use the ANI or CLI of the communication device to properly bill the user. The billing server unit **238** preferably comprises a Windows NT compatible PC.

The gateway server unit **246** is preferably connected to the LAN **240** and the Internet **220**. The gateway server unit **246** provides access to the

content provider **221** and the voice markup language server **257** via the Internet **220**. The gateway server unit **246** allows users to access the communication node **212** from the communication device **202** via the Internet **220**. The gateway server unit **246** can function as a firewall to control access to the communication node **212** to authorized users. The gateway server unit **246** is preferably a Cisco Router, also available from Cisco Systems.

The database server unit **244** is preferably connected to the LAN **240**. The database server unit **244** preferably includes a plurality of storage areas to store data relating to users, such as, for example, speech vocabularies, dialogs, personalities, user entered data, and other information. Preferably, the database server unit **244** stores a personal file or address book. The personal address book can contain information required for the operation of the communication system **200**, including user reference numbers, personal access codes, personal account information, contact's addresses, telephone numbers, etc. The database server unit **244** is preferably a PC, such as, for example, a Windows NT compatible PC.

The application server unit **242** is preferably connected to the LAN **240** and the content provider **208**. The application server unit **242** allows the communication node **212** to access information from a destination of the information sources, such as the content providers **208**, **221** and the markup language servers **209**, **251**, **253**, **257**. For example, the application server unit **242** can retrieve information (e.g., weather reports, stock information, traffic reports, restaurants, flower shops, banks, calendars, "to-do" lists, e-commerce, etc.) from a destination of the information sources. This application server unit **242** may include Starfish Software to provide the address book, calendar and to-do lists, and to allow the user to organize information. The application server unit **242** processes the retrieved information and provides the information to the VRU server **234** and the voice browser **250**. The VRU server **234** can provide an audio announcement to the user based upon the information using TTS synthesizing or human recorded voice. The application server unit **242** can also send tasks or requests (e.g., transactional information) received from the user to the information sources (e.g., a request to place an order for a pizza). The application server unit **242** can further receive user inputs from the VRU

server **234** based upon a speech recognition output. The application server unit **242** is preferably a PC.

The voice markup language server **251** is preferably connected to the LAN **240**. The voice markup language server **251** can include a database, scripts and markup language documents or pages. The voice markup language server **251** is preferably a PC, such as, for example, a Windows NT compatible PC. It will also be recognized that the voice markup language server **251** can be an Internet server (e.g., a Sun Microsystems server).

The messaging server **255** is preferably connected to the LAN **240**, the paging network **211**, an e-mail system **213** and a short message system (SMS) **290**. The messaging server **255** routes pages between the LAN **240** and the paging network **211**. The messaging server **255** is preferably a PC, such as, for example, a Windows NT compatible PC. The messaging server **255** can also provide direct storage. It is contemplated that the messaging server **255** can reside externally from the communication node **212**.

The voice browser **250** is preferably connected to the LAN **240**. The voice browser **250** preferably receives information from the markup language servers **209**, **251**, **253**, **257**, the database server unit **244** and the content providers **208**, **221**. In response to voice commands or DTMF signals, the voice browser **250** generates a content request (e.g., an electronic address) to navigate to a destination of one or more of the information sources. The content request can use at least a portion of a Uniform Resource Locator, an Internet Protocol, a page request, or e-mail.

After the voice browser **250** is connected to an information source, the voice browser **250** preferably uses a Transmission Control Protocol/Internet Protocol connection to pass requests to the information source. The information source responds to the requests, sending at least a portion of the requested information, represented in electronic form, to the voice browser **250**. The information can be stored in a database, and can include text content, markup language document or pages, non-text content, dialogs, audio sample data, recognition grammars, etc. The voice browser **250** then parses and interprets the information, further described below. The voice browser **250** can be integrated into the communication devices **201**, **202**, **203**, **204**, **205**.

As shown in **FIG. 5**, the content provider **208** is connected to the application server unit **242** of the communication node **212**, and the content provider **221** is connected to the gateway server unit **246** of the communication node **212** via the Internet **220**. The content providers **208**, **221** can store various content information, such as news, banking, commerce, weather, traffic conditions, etc. The content providers **208**, **221** can include a server to operate WWW pages or documents in the form of a markup language. The content providers **208**, **221** can also include a database, scripts and/or markup language documents or pages. The scripts can include images, audio, grammars, computer programs, etc. The content providers **208**, **221** execute suitable server software to send requested information to the voice browser **250**.

The voice mail unit **274** is preferably connected to the telephone switch **203** and the LAN **240**. The voice mail unit **274** can store voice mail messages from parties trying to send messages to the communication node **212**. When a user accesses the electronic network **206**, the voice mail unit **274** can notify the user of new and stored messages. The user can access the messages to play, delete, store and forward the messages. When the user accesses a message, the message can be read to the user or can be displayed as textual information on a communication device (e.g., a pager, a SMS **290**, or a PDA, etc.). The user can also access and operate external messages or mail systems remote from the electronic network **206**.

The FAX server unit **272** is preferably connected to the telephone switch **230** and the LAN **240**. The FAX server unit **272** receivers and stores facsimile information sent via the electronic network **206** or the carrier network **216**. Users can access the facsimile information to play, store, delete, and forward the information. The facsimile information can be read via the TTS unit **252** or can be displayed as textual information on a suitable communication device. The FAX server unit **272** preferably comprises a PC, such as, for example, a Windows NT compatible PC or a Dialogue Fax Server.

Further information regarding communication system **200** is disclosed in U.S. Patent Application No. **09/141,485**, entitled Telecommunication

System and Methods Therefore, filed August **27, 1998**, the entire disclosure of which is incorporated herein.

It should be appreciated that the embodiments described above are to be considered in all respects only illustrative and not restrictive. The scope of the invention is indicated by the following claims rather than by the foregoing description. All changes that come within the meaning and range of equivalents are to be embraced within their scope.